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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/628,661	07/28/2000	Norihiro Kawatoko	862.C1966	3244

5514 7590 07/21/2003

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EXAMINER

MOUTTET, BLAISE L

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 07/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/628,661

Applicant(s)

KAWATOKO ET AL.

Examiner

Blaise L Mouttet

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 7, 11-14, 18, 22-27, 29-32 and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Mantell US 6,189,993.

Stephany et al. discloses, regarding claims 1, 12, 37, 39 and 41, a printing apparatus and printing method comprising:

determining means (46) for performing a determination step of determining a fundamental pulse shape (pulse width) on the basis of driving conditions according to a condition of the print head wherein the conditions include desired spot size, ink type and copy sheet type which are all determined by a user (column 6, lines 19-39);

counting means (48, 50) for performing a counting step of counting the number of simultaneously driven printing elements of a plurality of printing elements when printing data is printed (column 5, lines 8-13, column 5, lines 45-49); and

control means (54) for performing a control step of controlling a drive pulse to be applied to printing elements used in the printing of the printing data, wherein the driving pulse is a pulse generated in the printing period by correcting the fundamental pulse

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width determined by said determining means/step (46) on the basis of the number of simultaneously driven printing elements counted by the counting means/step (48, 50) (figure 4, column 6, line 40-column 7, lines 12).

Stephany et al. discloses, regarding claims 2 and 13, that the driving conditions include at least environmental temperature (column 6, lines 57-63).

Stephany et al. discloses, regarding claims 3 and 14, storage means (46) for performing a storing step of storing first look-up tables (management tables) for managing the correspondence of the driving conditions with the fundamental pulse width (column 6, lines 19-39), a second look up table (management table) for managing the correspondence of the fundamental pulse width with a change amount of the fundamental pulse width based upon the number of simultaneously driven printing elements (column 5, lines 31-44); and

second determining means for performing a step of determining a change of the pulse width in accordance with the second look up table associated with the number of printing elements counted (column 5, lines 45-49),

wherein said first determining means/step (46) determines the fundamental pulse width using the first look up tables based on spot size, temperature, ink type (column 6, lines 19-38), and

said control means/step (54) changes the fundamental pulse width determined by said second determining means to generate a driving pulse to be applied to printing elements used in the printing of print data (column 6, line 57 - column 7, line 12).

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Regarding claims 7 and 18, the driving pulse, which increases as the number of simultaneously driven ink ejecting resistors increases (column 5, lines 47-49), experiences a decrease when the number of simultaneously driven ink ejectors exceeds a predetermined value (see column 7, lines 7-12 which explains that the output of the thermistor 60 determines the predetermined value). The examiner notes that it is inherent that an increase in the number of simultaneously driven ink ejectors increases the temperature of the print head since each ink ejector driven converts electric energy to thermal energy (see column 6, lines 43-51 of Stephany et al.).

Regarding claims 11 and 22, the print head is a thermal ink jet print head (column 2, lines 8-10).

Regarding claim 23, program codes for the discriminating and control steps are necessary since these steps are performed by ROM (44) and ink jet logic (54).

Regarding claims 24 and 29, the fundamental pulse width is selected and determined from a plurality of pulse widths (column 5, lines 31-37).

Regarding claims 25 and 30, the driving conditions include print head characteristics including the temperature and the position of the resistors on the print head (column 6, lines 57-63).

Regarding claims 26, 27, 31 and 32, Stephany et al. discloses that an index value (in increments of 1/8 of a microsecond) is formed representing a change in fundamental pulse width based on the number of simultaneously driven print elements (column 5, lines 31-37) and that the value of this index which modifies the pulse width is

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based upon printing conditions representative of a print mode (spot size, ink color) stored in look up tables (column 6, lines 19-39).

Regarding claims 34 and 35, the fundamental pulse width is determined based on a plurality of driving conditions including temperature, ink color and spot size (column 6, lines 19-39).

Stephany et al. fails to disclose, regarding claims 1, 12, 23, 36, 38 and 40, that the fundamental pulse width of the inkjet head determined by the user (as explained in column 6, lines 19-39 of Stephany et al.) is set prior to a printing period.

Mantell discloses setting driving conditions for an inkjet head by a user prior to a printing period (column 7, lines 45-63).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to set the user defined characteristics as explained by Stephany et al. prior to a printing period as taught by Mantell.

The motivation for doing so would have been to assure that the user is satisfied with the input data prior to printing as suggested by column 7, lines 45-63 of Mantell.

2. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Mantell US 6,189,993, as applied to claims 1 and 12, and further in view of Corrigan et al. US 6,183,056.

Stephany et al. in view of Mantell render obvious the limitations of claims 1 and 12 as explained above.

Stephany et al. in view of Mantell fails to disclose that independent power lines for sending power to a plurality of print heads are individually controlled.

Corrigan et al. teaches providing separate control lines between separate quadrants of inkjet printheads (column 2, line 49 - column 3, line 3).

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to individually control separate power lines going to separate print heads in the apparatus of Stephany et al. in view of Mantell as taught by Corrigan et al.

The motivation for doing so would have been in order to compensate for variations between separate printheads as taught by column 1, line 49 - column 2, line 22 of Corrigan et al.

3. Claims 4, 5, 10, 15, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Mantell US 6,189,993, as applied to claims 1 and 12, and further in view of Nagoshi et al. EP 626 266.

Stephany et al. in view of Mantell render obvious the limitations of claims 1 and 12 as explained above.

Stephany et al. discloses, regarding claims 5 and 16, storage means (46) for storing a first management table managing the correspondence of the fundamental pulse width with driving conditions (spot size, ink type, temperature) in column 6, lines 19-39 and a second management table managing the correspondence of the pulse width with the number of driven print elements (column 5, lines 45-60).

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Stephany et al. in view of Mantel fails to disclose, regarding claims 4, 5, 15 and 16, that the fundamental pulse width is defined by one of leading and trailing edges or setting up a management table for managing correspondence between the rise and fall time and the pulse width.

Stephany et al. in view of Mantel fails to disclose, regarding claims 10 and 21, that predischARGE recovery of the print head is performed.

Nagoshi et al. discloses forming a pulse width for driving an ink jet print head from a preheat (predischARGE) recovery pulse (P1) and an ejection pulse (P3) (figure 15, page 11, line 52 - page 12, line 7), that the pulse widths are defined by leading and trailing edges (figure 33) in which a management table is stored for controlling the pulse widths on the basis of drive conditions (figures 30-32, page 20, lines 36-53).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a predischARGE recovery pulse in the pulse disclosed by Stephany et al. in view of Mantel and define the pulse by the leading or trailing edges as disclosed by Nagoshi et al.

The motivation for doing so would have been in order to better control the temperature of the inks used in the printhead of Stephany et al. in view of Mantel as suggested by page 11, line 52 - page 12, line 7 of Nagoshi et al. so that the droplet size is stable at elevated temperatures.

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4. Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Mantell US 6,189,993, as applied to claims 1 and 12, and further in view of Wysocki et al. US 5,223,853.

Stephany et al. in view of Mantell render obvious the limitations of claims 1 and 12 as explained above.

Stephany et al. discloses that the temperature in the printhead is directly related to the number of simultaneously firing resistors and that this requires adjustment of the firing pulse width (column 6, lines 43-52).

Stephany et al. in view of Mantel fails to disclose increasing a change amount for the driving pulse width when the number of simultaneously driven printing elements is less than a predetermined value.

Wysocki et al. teaches increasing a driving pulse width for an ink jet printer as the temperature of the print head (which is directly related to the number of actuated printing elements as taught by Stephany et al.) decreases as shown in figure 2B (column 3, lines 9-16).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to increase a change amount for the driving pulse of Stephany et al. in view of Mantel as shown by Wysocki et al. when the number of simultaneously driven printing elements decreases below a predetermined value.

The motivation for doing so would have been to obtain a dot of desired size on a copy sheet as taught by column 4, lines 53-65 of Wysocki et al.

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5. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Mantell US 6,189,993, as applied to claims 1 and 12, and further in view of Ebisawa US 5,289,207.

Stephany et al. in view of Mantell render obvious the limitations of claims 1 and 12 as explained above.

Stephany et al. in view of Mantell fails to disclose making a pulse width used for predischARGE for recovering said printhead larger than a pulse width of a driving pulse used for printing when the number of simultaneously driven elements for predischARGE is limited.

Ebisawa teaches applying a pulse width during a recovery predischARGE larger than a pulse width during printing to increase discharge energy during recovery (see abstract, column 6, lines 10-15).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to make the applied pulse width during predischARGE larger than the applied pulse width during printing in the method and apparatus of Stephany et al. in view of Mantell as taught by Ebisawa.

The motivation for doing so would have been to perform a recovery operation for the printhead that would enable a longer lifespan for the printhead as taught by column 2, lines 26-30 of Ebisawa.

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6. Claims 28 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Mantell US 6,189,993, as applied to claims 27 and 32, and further in view of Courtney US 5,610,638.

Stephany et al. in view of Mantell render obvious the limitations of claims 27 and 32 as explained above.

Stephany et al. discloses that various look up tables can be formed based on printing modes to determine the change of pulse width in order to maintain a normal drop size (column 6, lines 19-39).

Stephany et al. in view of Mantel fails to show utilization of a complementary printing mode for printing in accordance with a printing pass count to establish the normal drop size.

Courtney discloses using a single pass mode or a double pass mode for an ink jet print head in order to maintain a normal drop size (column 2, lines 31-52).

It would have been obvious to a person of ordinary skill in the art to include a complementary double pass mode as shown by Courtney as one of the printing modes disclosed by Stephany et al. in view of Mantel.

The motivation for doing so would have been in order to better control the ink drop size in accordance as taught by Courtney (column 2, lines 31-33).

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Respons to Arguments

7. Applicant's arguments filed June 25, 2003 have been fully considered.

The examiner agrees that the amendment has overcome the prior rejection.

However the amendment has necessitated new grounds of rejection as noted above.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is

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(703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier, Art Unit 2853, can be reached at (703) 308-4896. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet July 7, 2003

Bm 7/7/2003


Stephen D. Meier
Primary Examiner